ELECTRICAL ENGINEER

PERFORMANCE ANALYSIS OF PILOT-AIDED FORWARD CDMA CELLULAR CHANNEL
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In this thesis the performance of the forward channel of a DS-CDMA cellular system operating in a Rayleigh-fading, Lognormal-shadowing environment is analyzed. An upper bound on the probability of bit error, including all the participating interference is developed. In addition, various techniques such as sectoring and forward error correction in the terms of convolutional encoding are applied to optimize the performance. The performance is further improved by applying a narrow bandpass filter in the pilot tone branch of the demodulator. The bandwidth of the filter is then adjusted in the means of the interference power passing through and observe the effects on the probability of bit error of the system. Moreover, pilot tone power control is added to enhance the demodulation. Finally, in this thesis a simple single cell system functioning as a port-to -port network communication between very small numbers of users is analyzed.

A 3D PARABOLIC EQUATION (PE) BASED TECHNIQUE FOR PREDICTING PROPAGATION PATH LOSS IN AN URBAN AREA
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A mobile radio environment places fundamental limitations on the performance of wireless communication systems. Most models developed to predict propagation path loss have been historically performed in a statistical approach. These models are expensive to develop and do not offer the accuracy, computational advantages, and sufficiency as the parabolic equation (PE). The goal of this thesis is to develop a 3D model based on PE for predicting propagation path loss in urban areas on flat and hilly terrains. The PE method offers the computational advantages, where one can approximate the elliptic operator governing the true wave behavior by a much simpler parabolic operator that permits marching in range. Moreover those all-important aspects of propagation such as reflection and diffraction are included automatically in the formulation. Four test problems on flat terrain and two test problems on hilly terrain will be simulated. For the flat terrain, the 3D PE model results will be compared with the two-ray, the four-ray, the UTD, and the numerical integration technique results. For the hilly terrain, the results of the 3D PE model will be compared with the UTD and the numerical integration technique results.

DESIGN AND IMPLEMENTATION OF A HIGH-POWER RESONANT DC-DC CONVERTER MODULE FOR A REDUCED-SCALE PROTOTYPE INTEGRATED POWER SYSTEM

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An Integrated Power System (IPS) with a DC Zonal Electrical Distribution System (DCZEDS) is a strong candidate for the next generation submarine and surface ship. To study the implementation of an IPS with DCZEDS, members of the Energy Sources Analysis Consortium (ESAC) are currently constructing a reduced-scale laboratory. One fundamental component of DCZEDS is the Ships Service Converter Module (SSCM), commonly known as a buck DC-DC converter. This thesis documents the design, simulation, construction and testing of a 500V/400V, 8kW resonant soft-switched DC-DC converter. In theory, resonant converters will operate more efficiently and generate less Electromagnetic Interference (EMI) when compared to a standard hard-switched converter. In this thesis, the resonant converter is tested and compared to a hard-switched DC-DC converter that was designed for ESAC's reduced-scaled IPS. The results verify that the resonant DC-DC converter realizes significant efficiency and EMI generation improvements over the hard-switched converter at the cost of a more complex control system and power section.